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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,073	05/14/2001	David Tucker	37357.0100	8589

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EXAMINER

HENEGHAN, MATTHEW E

ART UNIT PAPER NUMBER

2134

DATE MAILED: 11/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/855,073		TUCKER ET AL.	
	Examiner		Art Unit	
	Matthew Heneghan		2134	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) 11, 13-20, 24-42, 46, 47 and 54-57 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12, 21-23 and 48-53 is/are rejected.
- 7) ☒ Claim(s) 43-45 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/15/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In response to the previous office action, claims 1-4, 10, 12, 21, 22, 48, 49, and 53 have been amended. Claims 1-10, 12, 21-23, 43-45, and 48-53 have been examined.

Information Disclosure Statement

2. The following Information Disclosure Statement in the instant application has been considered:

IDS filed 15 August 2005.

Drawings

3. The drawings were received on 15 August 2005. These drawings are not acceptable.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(m) because the shading of the graphic in figure 7 makes it illegible.

5. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

6. The use of the trademarks Java, Visual Basic, InstallShield, Unix, Linux, Appletalk, and BeOS have been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

7. In view of Applicant's amendments, all previous claim objections are withdrawn.

Claim Rejections - 35 USC § 101

8. In view of Applicant's amendments, all previous rejections are 35 U.S.C. 101 are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant's specification merely refers to several methods for several recovery methods that are not well-known in the art (symmetric correlation, asymmetric correlation, etc.) without describing the methods. It is being presumed that any deobfuscation method teaches to claim 23.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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10. In view of Applicant's amendments, the previous rejections under 35 U.S.C. 112, second paragraph of claims 2-4 have been withdrawn.

11. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

Regarding claim 22, the omitted structural cooperative relationships are: No limitation shows how the original instruction code length calculation recited in the first limitation is related to the remainder of the invention. Since all modern computer systems maintain the sizes of files, this limitation is being deemed as inherent.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 1-4, 6-10, 12, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIPO Patent Publication No. 99/01815 to Collberg et al. in view of U.S. Patent No. 6,829,710 to Venkatesan et al.

As per claims 1 and 10, the system disclosed by Collberg takes compiled code and obfuscates (i.e. creates isomorphic code) it in a random manner when possible. In order to determine when obfuscation is possible, the code must be scanned (see abstract; p. 53, line 21 to p. 55, line 16; and p. 68 line 14 to p. 69, line 9).

Collberg does not disclose the random selection from a set of isomorphic codes.

Venkatesan discloses the random selection of functions from a library in the process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51), and suggests that this is done to frustrate third-part detection of the watermark (see abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Collberg by randomly selecting functions from a library in the process of watermarking code, as disclosed by Venkatesan, as this is done to frustrate third-part detection of the watermark.

As per claims 2 and 3, Collberg further discloses the combining of multiple types of transformations (at least three types are disclosed), thus creating later generation isomorphs (see p. 53, lines 10-19 and p.86, line 27 to p. 89, line 22).

As per claim 4, Collberg discloses the generation of different obfuscated versions of a program for different customers (see p. 98, lines 24-30).

As per claim 6, Collberg discloses Java® applications, which are generated at a server and executed on a client (see entire document).

As per claim 7, Collberg discloses the insertion of inert (benign) code (see p. 42, lines 4-27).

As per claims 8 and 9, the system is implemented on a stand-alone system called "Kava," which may optionally use libraries (see p. 4, lines 13-15 and p. 25, line 25 to p. 26, line 15).

Regarding claim 12, 21, and 22, compiled code comprises original CPU instructions.

Regarding claim 23, Collberg describes several deobfuscation algorithms (see p. 72, line 1 to p. 83, line 2).

13. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,696,822 to Nachenberg in view of U.S. Patent No. 6,829,710 to Venkatesan et al.

Nachenberg discloses that a polymorphic virus (i.e. self-replicating code) provides each new file with a mutated (obfuscated) version of the virus, as this frustrates most standard virus-detection schemes (see column 1, lines 11-17).

Nachenberg does not disclose the random selection from a set of isomorphic codes.

Venkatesan discloses the random selection of functions from a library in the process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51), and suggests that this is done to frustrate third-part detection of the watermark (see abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Nachenberg by randomly selecting

functions from a library in the process of watermarking code, as disclosed by Venkatesan, as this is done to frustrate third-part detection of the watermark.

14. Claims 48, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,829,710 to Venkatesan et al.

Regarding claims 48 and 49, Drake discloses the insertion of obfuscating code, which is isomorphic, in appropriate places. Scanning the code is necessary to determine such places (see column 5, line 37 to column 6, line 3). Drake also discloses the encryption of code after obfuscation, and notes that the encryption scheme used can be subjected to substantial variation (see column 16, lines 3-9).

Drake does not disclose the use of random algorithms.

Venkatesan discloses the random selection of functions from a library in the process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51), and suggests that this is done to frustrate third-part detection of the watermark (see abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Drake by randomly selecting functions from a library in the process of watermarking code, as disclosed by Venkatesan, as this is done to frustrate third-part detection of the watermark.

Regarding claim 51, Drake discloses a symmetric algorithm, DES, as an exemplary encryption algorithm; the combination of Drake and Venkatesan therefore would offer a symmetric algorithm.

Regarding claim 52, the invention of Drake is intended for try-before-you-buy software (see column 3, lines 1-6).

Regarding claim 53, Drake discloses the use of a signature key (a checksum) which prevents the successful decryption if the code has been tampered with (see column 16, lines 44-48).

15. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,829,710 to Venkatesan et al. as applied to claim 48 further in view of U.S. Patent No. 5,966,450 to Hosford et al.

Drake and Venkatesan do not disclose the usage of a previous result for key generation.

Hosford discloses the results from previous iterations to generate keys (see column 5, lines 43-55), and further suggests that this increase the difficulty of unauthorized decryption (see column 4, lines 5-11).

Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Drake and Venkatesan by using the results from previous iterations to generate keys, as disclosed by Hosford, as this increase the difficulty of unauthorized decryption.

Allowable Subject Matter

16. Claims 43-45 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter: No art could be found that suggested a detection of tampering of obfuscated code by comparing two generated CRC's, one generated during code execution. The closest art, Drake, which uses checksums, and U.S. Patent No. 6,587,947 to O'Donnell et al., which uses CRCs to authenticate obfuscated code, do not use the values during execution. Venkatesan suggests the use of error correction procedures (see column 8, lines 13-16), but not to system files.

Response to Arguments

18. Regarding the rejection of claim 23 under 35 U.S.C. 112, first paragraph, Applicant's arguments filed 15 August 2005 have been fully considered but they are not persuasive. In order for a claim containing a Markush group to satisfy the enablement requirement under 35 U.S.C. 112, first paragraph, every individual member of that group must be enabled by the disclosure. While it is agreed that look-up tables and

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database queries are well-known in the art and that one of ordinary skill in the art would recognize the algorithm in the last paragraph of page 12 (see Remarks, filed 15 August 2005, p. 26) as a functional correlation in view of Applicant's arguments, as well as a one-way function, an ordinary would not recognize a symmetric correlation, asymmetric correlation, or parametric correlation from Applicant's disclosure. Each of these three terms are not well-known in the art and are only nominally recited in Applicant's disclosure. There is no guidance as to how an ordinary would recognize that they are being practiced.

19. Regarding the rejection of claim 22 under 35 U.S.C. 112, second paragraph, Applicant's arguments filed 15 August 2005 have been fully considered but they are not persuasive. None of the other limitations teach to the relevance of the length calculation made in the first limitation. Applicant could overcome this rejection by amending the second or third limitations such that at least one of them uses the calculated length for some purpose.

20. Applicant's arguments, see Remarks, filed 15 August 2005, with respect to the rejections of the claims under 35 U.S.C. 102 and 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the art cited above.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,748,741 to Johnson et al. discloses various techniques for code obfuscation.

U.S. Patent No. 5,892,899 to Aucsmith et al. discloses code obfuscation using random patterns.

U.S. Patent No. 6,594,761 to Chow et al. discloses obfuscation by transforming code flows.

U.S. Patent Application Publication No. 2002/0027986 to Brenke discloses code obfuscation using symbolic logic.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Heneghan, whose telephone number is (571) 272-3834. The examiner can normally be reached on Monday-Friday from 8:30 AM - 4:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Morse, can be reached at (571) 272-3838.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

Or faxed to:

(571) 273-3800


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


GREGORY MORSE
SUPERVISORY PATENT EXAMINER
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October 22, 2005